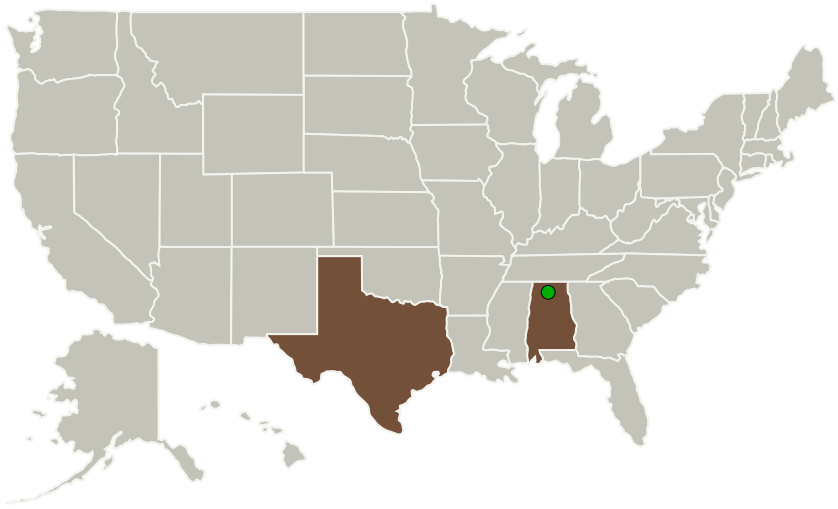
Non Thermal Plasma Assisted Catalytic Reactor for CO2 Methanation, Phase II

Completed Technology Project (2014 - 2016)

Project Introduction

In situ production of methane as propellant by methanation of CO2, also called Sabatier reaction, is a key enabling technology required for sustainable and affordable human exploration of Mars. The Sabatier reaction is conventionally carried out in a fixed bed catalyst at high temperatures of 350-400 ?C. For the long duration future Mars missions (~ 18 months expected stay on Mars), the fixed bed Sabatier reactor design however is inadequate due to performance and catalyst durability issues. In addition thermal management within the reactor is a major issue due to exothermicity of the reaction. Lynntech has demonstrated the feasibility of a novel low power, low temperature plasma assisted catalysis process for addressing these limitations with the methanation of CO2 at a scale of 14 g/h methane production rate. In the Phase II project, Lynntech proposes to build and demonstrate a full scale (0.55 kg/h methane production rate) Sabatier reactor for NASA application. The anticipated Technology Readiness Level at the beginning and ending of Phase II will be 3 and 4, respectively.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Lynntech, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Continued on following page.

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Lynntech, Inc.	Lead Organization	Industry	College Station, Texas
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Texas

Project Transitions

May 2014: Project Start

June 2016: Closed out

Closeout Summary: Non Thermal Plasma Assisted Catalytic Reactor for CO2 Methanation, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/137474)*

Images

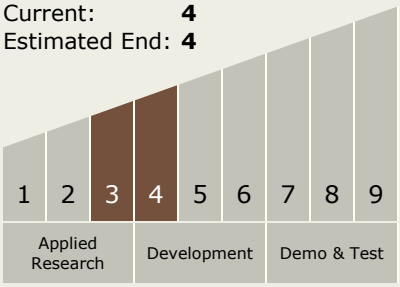
Briefing Chart Image
Non Thermal Plasma Assisted Catalytic Reactor for CO2 Methanation, Phase II
(https://techport.nasa.gov/image/130699)

Project Management *(cont.)*

Principal Investigator:
Mahesh Waje

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System